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("genetic algorithm" or "genetic programming") and (co

PAT. NO. Title

- 1 [6,424,959](#) Method and apparatus for automatic synthesis, placement and routing of complex structures
- 2 [6,360,191](#) Method and apparatus for automated design of complex structures using genetic programming
- 3 [6,272,479](#) Method of evolving classifier programs for signal processing and control
- 4 [5,867,397](#) Method and apparatus for automated design of complex structures using genetic programming
- 5 [5,148,513](#) Non-linear genetic process for use with plural co-evolving populations

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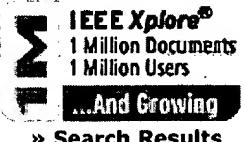


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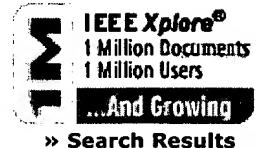
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*Sakanashi, H.; Kakazu, Y.;*

Emerging Technologies and Factory Automation, 1994. ETFA '94., IEEE Symposium on, 6-10 Nov. 1994

Pages:454 - 457

[\[Abstract\]](#) [\[PDF Full-Text \(284 KB\)\]](#) **IEEE CNF**

2 **A hybrid GP/GA approach for co-evolving controllers and robot bodies to achieve fitness-specified tasks**

*Wei-Po Lee; Hallam, J.; Lund, H.H.;*

Evolutionary Computation, 1996., Proceedings of IEEE International Conference on, 20-22 May 1996

Pages:384 - 389

[\[Abstract\]](#) [\[PDF Full-Text \(592 KB\)\]](#) **IEEE CNF**

3 **A method for co-evolving morphology and walking pattern of biped humanoid robot**

*Endo, K.; Yamasaki, F.; Maeno, T.; Kitano, H.;*

Robotics and Automation, 2002. Proceedings. ICRA '02. IEEE International Conference on, Volume: 3, 11-15 May 2002

Pages:2775 - 2780

[\[Abstract\]](#) [\[PDF Full-Text \(646 KB\)\]](#) **IEEE CNF**

4 **Protein structure prediction with co-evolving memetic algorithms**

*Smith, J.E.;*

Evolutionary Computation, 2003. CEC '03. The 2003 Congress on, Volume: 4, 8-12 Dec. 2003

Pages:2346 - 2353 Vol.4

[\[Abstract\]](#) [\[PDF Full-Text \(1687 KB\)\]](#) [IEEE CNF](#)

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**5 Co-evolving memetic algorithms: a learning approach to robust scalable optimisation**

*Smith, J.E.;*

Evolutionary Computation, 2003. CEC '03. The 2003 Congress on , Volume: 1 , 8-12 Dec. 2003

Pages:498 - 505 Vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(1732 KB\)\]](#) [IEEE CNF](#)

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**6 Evolving finite state machines with embedded genetic programming for automatic target detection**

*Benson, K.;*

Evolutionary Computation, 2000. Proceedings of the 2000 Congress on , Volume: 2 , 16-19 July 2000

Pages:1543 - 1549 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(784 KB\)\]](#) [IEEE CNF](#)

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**7 Evolving robot morphology**

*Lund, H.H.; Hallam, J.; Wei-Po Lee;*

Evolutionary Computation, 1997., IEEE International Conference on , 13-16 April 1997

Pages:197 - 202

[\[Abstract\]](#) [\[PDF Full-Text \(632 KB\)\]](#) [IEEE CNF](#)

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**8 Genetic design of robust PID controllers to deal with prescribed plant uncertainties through a process of competitive co-evolution**

*Jones, A.H.; Ajlouni, N.; Kenway, S.B.; De Moura Oliveira, P.B.;*

Intelligent Control, 1996., Proceedings of the 1996 IEEE International Symposium on , 15-18 Sept. 1996

Pages:372 - 377

[\[Abstract\]](#) [\[PDF Full-Text \(496 KB\)\]](#) [IEEE CNF](#)

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**9 Agent-oriented framework for decision tree evolution**

*Sprogar, M.; Colnaric, M.;*

Intelligent Agent Technology, 2003. IAT 2003. IEEE/WIC International Conference on , 13-16 Oct. 2003

Pages:503 - 506

[\[Abstract\]](#) [\[PDF Full-Text \(245 KB\)\]](#) [IEEE CNF](#)

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**10 Dynamic behavior control of autonomous mobile robots using schema co-evolutionary algorithm**

*Kwee-Bo Sim; Ho-Byung Chun; Dong-Wook Lee;*

Industrial Electronics, 2001. Proceedings. ISIE 2001. IEEE International Symposium on , Volume: 1 , 12-16 June 2001

Pages:560 - 565 vol.1

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[\[Abstract\]](#) [\[PDF Full-Text \(603 KB\)\]](#) [IEEE CNF](#)

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**11 The rhythms of high technology firms: nonlinear dynamics and strategic analysis**

*Daneke, G.A.;*

Management of Engineering and Technology, 1999. Technology and Innovation Management. PICMET '99. Portland International Conference on , Volume: 1 , 25-29 July 1999

Pages:446 vol.1

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[\[Abstract\]](#) [\[PDF Full-Text \(84 KB\)\]](#) [IEEE CNF](#)

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**12 Evolutionary learning, reinforcement learning, and fuzzy rules for knowledge acquisition in agent-based systems**

*Bonarini, A.;*

Proceedings of the IEEE , Volume: 89 , Issue: 9 , Sept. 2001

Pages:1334 - 1346

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[\[Abstract\]](#) [\[PDF Full-Text \(192 KB\)\]](#) [IEEE JNL](#)

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**13 Searching for a solution: engineering tradeoffs and the evolution of provably secure protocols**

*Clark, J.A.; Jacob, J.L.;*

Security and Privacy, 2000. S&P 2000. Proceedings. 2000 IEEE Symposium on , 14-17 May 2000

Pages:82 - 95

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[\[Abstract\]](#) [\[PDF Full-Text \(412 KB\)\]](#) [IEEE CNF](#)

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**14 COSEARCH: a co-evolutionary metaheuristic**

*Bachelet, V.; Talbi, E.-G.;*

Evolutionary Computation, 2000. Proceedings of the 2000 Congress on , Volume: 2 , 16-19 July 2000

Pages:1550 - 1557 vol.2

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[\[Abstract\]](#) [\[PDF Full-Text \(572 KB\)\]](#) [IEEE CNF](#)

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**15 Evolutionary artificial neural networks for competitive learning**

*Brown, A.D.; Card, H.C.;*

Neural Networks,1997., International Conference on , Volume: 3 , 9-12 June 1997

Pages:1558 - 1562 vol.3

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[\[Abstract\]](#) [\[PDF Full-Text \(316 KB\)\]](#) [IEEE CNF](#)

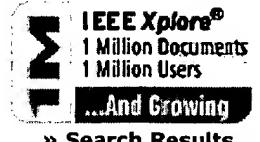
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16 **Using co-evolution to produce robust robot control**

*McNutt, G.;*  
Decision and Control, 1997., Proceedings of the 36th IEEE Conference on , Volume: 3 , 10-12 Dec. 1997  
Pages:2515 - 2520 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(660 KB\)\]](#) **IEEE CNF**

17 **Co-evolution of morphology and walking pattern of biped humanoid robot using evolutionary computation:designing the real robot**

*Endo, K.; Maeno, T.; Kitano, H.;*  
Robotics and Automation, 2003. Proceedings. ICRA '03. IEEE International Conference on , Volume: 1 , 14-19 Sept. 2003  
Pages:1362 - 1367 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(408 KB\)\]](#) **IEEE CNF**

18 **Evolving market design in zero-intelligence trader markets**

*Walia, V.; Byde, A.; Cliff, D.;*  
E-Commerce, 2003. CEC 2003. IEEE International Conference on , 24-27 June 2003  
Pages:157 - 164

[\[Abstract\]](#) [\[PDF Full-Text \(353 KB\)\]](#) **IEEE CNF**

19 **Evolving control for modular robotic units**

*Ostergaard, E.H.; Lund, H.H.;*  
Computational Intelligence in Robotics and Automation, 2003. Proceedings. 2003 IEEE International Symposium on , Volume: 2 , 16-20 July 2003  
Pages:886 - 892 vol.2

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[\[Abstract\]](#) [\[PDF Full-Text \(679 KB\)\]](#) [IEEE CNF](#)

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**20 A co-evolutionary approach to modelling the behaviour of participants in competitive electricity markets**

*Thai Doan Hoang Cau; Anderson, E.J.;*

Power Engineering Society Summer Meeting, 2002 IEEE , Volume: 3 , 21-25 July 2002

Pages:1534 - 1540 vol.3

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[\[Abstract\]](#) [\[PDF Full-Text \(332 KB\)\]](#) [IEEE CNF](#)

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**21 The co-evolution of model parameters and control programs in evolutionary robotics**

*Parker, G.B.;*

Computational Intelligence in Robotics and Automation, 1999. CIRA '99.

Proceedings. 1999 IEEE International Symposium on , 8-9 Nov. 1999

Pages:162 - 167

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[\[Abstract\]](#) [\[PDF Full-Text \(552 KB\)\]](#) [IEEE CNF](#)

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**22 Classifier systems evolving multi-agent system with distributed elitism**

*Enea, G.; Escazut, C.;*

Evolutionary Computation, 1999. CEC 99. Proceedings of the 1999 Congress on , Volume: 3 , 6-9 July 1999

Pages: 1746 Vol. 3

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[\[Abstract\]](#) [\[PDF Full-Text \(532 KB\)\]](#) [IEEE CNF](#)

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**23 Shared memory based cooperative coevolution**

*Puppala, N.; Sen, S.; Gordin, M.;*

Evolutionary Computation Proceedings, 1998. IEEE World Congress on

Computational Intelligence., The 1998 IEEE International Conference on , 4-9 May 1998

Pages:570 - 574

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[\[Abstract\]](#) [\[PDF Full-Text \(524 KB\)\]](#) [IEEE CNF](#)

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**24 Co-evolution of the fitness function and design solution for design exploration**

*Maher, M.L.; Poon, J.;*

Evolutionary Computation, 1995., IEEE International Conference on , Volume:

1 , 29 Nov.-1 Dec. 1995

Pages:240

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[\[Abstract\]](#) [\[PDF Full-Text \(408 KB\)\]](#) [IEEE CNF](#)

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**25 Robust co-evolutionary design of SISO Smith predictor PID controllers**

*Oliveira, P.B.D.M.; Jones, A.H.;*

Genetic Algorithms In Engineering Systems:Innovations And Applications, 1997.

GALESIA 97. Second International Conference On (Conf. Publ. No. 446) , 2-4 Sept. 1997

Pages:504 - 509

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**1** [Enhancing information retrieval by automatic acquisition of textual relations using genetic programming](#)

Agneta Bergström, Patricija Jaksetic, Peter Nordin

 January 2000 **Proceedings of the 5th international conference on Intelligent user interfaces**

 Full text available: [pdf\(633.96 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We have explored a novel method to find textual relations in electronic documents using genetic programming and semantic networks. This can be used for enhancing information retrieval and simplifying user interfaces. The automatic extraction of relations from text enables easier updating of electronic dictionaries and may reduce interface area both for search input and hit output on small screens such as cell phones and PDAs (Personal Digital Assistants).

**Keywords:** genetic programming, information retrieval, machine learning, natural language processing, semantic networks

**2** [Evolutionary computation and optimization \(ECO\): Genetic Programming for data classification: partitioning the search space](#)

Jeroen Eggemont, Joost N. Kok, Walter A. Kosters

 March 2004 **Proceedings of the 2004 ACM symposium on Applied computing**

 Full text available: [pdf\(167.81 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

When Genetic Programming is used to evolve decision trees for data classification, search spaces tend to become extremely large. We present several methods using techniques from the field of machine learning to refine and thereby reduce the search space sizes for decision tree evolvers. We will show that these refinement methods improve the classification performance of our algorithms.

**Keywords:** data classification, genetic programming

**3** [A genetic algorithm for optimizing problems with multiple disparate data types](#)

Gary M. Gibson

 February 1995 **Proceedings of the 1995 ACM symposium on Applied computing**

Full text available:  pdf(605.86 KB) Additional Information: [full citation](#), [references](#), [index terms](#)

4 Research papers: data/knowledge management: Reexamining *tf.idf* based information retrieval with genetic programming

Nir Oren

September 2002 **Proceedings of the 2002 annual research conference of the South African institute of computer scientists and information technologists on Enablement through technology**

Full text available:  pdf(180.72 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The *tf.idf* family of vector based information retrieval schemes is very popular due to its simplicity and robustness, as well as its tractability to enhancements. This paper proposes a method to automatically perform a search for new *tf.idf* like schemes using genetic programming. The results of this automated search are then evaluated in a simple usage scenario. Also evaluated are the effects of using different fitness functions in the genetic programming phase.

**Keywords:** genetic programming, information retrieval, *tf.idf*

5 Genetic programming applied to Othello: introducing students to machine learning research

Eleazar Eskin, Eric Siegel

March 1999 **ACM SIGCSE Bulletin , The proceedings of the thirtieth SIGCSE technical symposium on Computer science education**, Volume 31 Issue 1

Full text available:  pdf(670.28 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper we describe and analyze a three week assignment that was given in a Machine Learning course at Columbia University. The assignment presented students with an introduction to machine learning research. The assignment required students to apply Genetic Programming to evolve algorithms that play the board game Othello. The students were provided with an implemented experimental approach as a starting point. The students were required to perform their own experimental modifications cor ...

6 Meta optimization: improving compiler heuristics with machine learning

Mark Stephenson, Saman Amarasinghe, Martin Martin, Una-May O'Reilly

May 2003 **ACM SIGPLAN Notices , Proceedings of the ACM SIGPLAN 2003 conference on Programming language design and implementation**, Volume 38 Issue 5

Full text available:  pdf(302.23 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Compiler writers have crafted many heuristics over the years to approximately solve NP-hard problems efficiently. Finding a heuristic that performs well on a broad range of applications is a tedious and difficult process. This paper introduces Meta Optimization, a methodology for automatically fine-tuning compiler heuristics. Meta Optimization uses machine-learning techniques to automatically search the space of compiler heuristics. Our techniques reduce compiler design complexity by relieving c ...

**Keywords:** compiler heuristics, genetic programming, machine learning, priority functions

7 A few new features for genetic algorithms

Marshall Graves, William Hooper

April 1998 **Proceedings of the 36th annual Southeast regional conference**

Full text available:  pdf(696.05 KB) Additional Information: [full citation](#), [references](#), [index terms](#)

**8 Scalability of an MPI-based fast messy genetic algorithm** 

Laurence D. Merkle, George H. Gates, Gary B. Lamont

February 1998 **Proceedings of the 1998 ACM symposium on Applied Computing**

Full text available:  pdf(678.15 KB) Additional Information: [full citation](#), [references](#), [index terms](#)

**Keywords:** fixed solution quality, messy genetic algorithms, parallel genetic algorithms, polypeptide structure prediction, population sizing

**9 Evolutionary algorithms in data mining: multi-objective performance modeling for direct marketing** 

Siddhartha Bhattacharyya

August 2000 **Proceedings of the sixth ACM SIGKDD international conference on Knowledge discovery and data mining**

Full text available:  pdf(115.20 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** Pareto-optimal models, data mining, database marketing, evolutionary computation, multiple objectives

**10 Stable algorithms for link analysis** 

Andrew Y. Ng, Alice X. Zheng, Michael I. Jordan

September 2001 **Proceedings of the 24th annual international ACM SIGIR conference on Research and development in information retrieval**

Full text available:  pdf(208.24 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The Kleinberg HITS and the Google PageRank algorithms are eigenvector methods for identifying ``authoritative'' or ``influential'' articles, given hyperlink or citation information. That such algorithms should give reliable or consistent answers is surely a desideratum, and in~\cite{ijcaiPaper}, we analyzed when they can be expected to give stable rankings under small perturbations to the linkage patterns. In this paper, we extend the analysis and show how it gives insight into ways of de ...

**11 Learning methods to combine linguistic indicators: improving aspectual classification and revealing linguistic insights** 

Eric V. Siegel, Kathleen R. McKeown

December 2000 **Computational Linguistics**, Volume 26 Issue 4

Full text available:  pdf(1.96 MB)  Additional Information: [full citation](#), [abstract](#), [references](#)  
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Aspectual classification maps verbs to a small set of primitive categories in order to reason about time. This classification is necessary for interpreting temporal modifiers and assessing temporal relationships, and is therefore a required component for many natural language applications. A verb's aspectual category can be predicted by co-occurrence frequencies between the verb and certain linguistic modifiers. These frequency measures, called linguistic indicators, are chosen by linguistic insi ...

**12 A simulation of adaptive agents in a hostile environment**

Thomas D. Haynes, Roger L. Wainwright

February 1995 **Proceedings of the 1995 ACM symposium on Applied computing**Full text available:  [pdf\(669.79 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)**Keywords:** autonomous agent, genetic programming, parallel evaluation of fitness, variable fitness function**13 Holland classifier systems**

Andreas Geyer-Schulz

June 1995 **ACM SIGAPL APL Quote Quad , Proceedings of the international conference on Applied programming languages**, Volume 25 Issue 4Full text available:  [pdf\(1.28 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A Holland classifier system is an adaptive, general purpose machine learning system which is designed to operate in noisy environments with infrequent and often incomplete feedback. Examples of such environments are financial markets, stock management systems, or chemical processes. In financial markets, a Holland classifier system would develop trading strategies, in a stock management system order heuristics, and in a chemical plant it would perform process control. In this paper we descr ...

**Keywords:** bucket brigade, classifier system, genetic algorithm, machine learning, triggered operations**14 Declarative data mining: Mining interesting regions using an evolutionary algorithm**

J. L. Álvarez, J. Mata, J. C. Riquelme

March 2002 **Proceedings of the 2002 ACM symposium on Applied computing**Full text available:  [pdf\(547.24 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we offer a new method to induce interesting knowledge from the relevant sets of data in databases for supervised learning. Thus, in this work, ELLIPSES is presented as a new method oriented to discover knowledge according to the expert's needs, by the detection of the most significant regions. The method essence is found in an evolutionary algorithm that finds these regions one after another. The expert decides which regions are significant and determines the stop criterion. The e ...

**Keywords:** data mining, evolutionary algorithm, supervised learning**15 Workshop and conference summaries: The SEMINAL workshop: reformulating software engineering as a metaheuristic search problem**

Mark Harman, Bryan F. Jones

November 2001 **ACM SIGSOFT Software Engineering Notes**, Volume 26 Issue 6Full text available:  [pdf\(587.65 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

This paper reports on the first international Workshop on Software Engineering using Metaheuristic INnovative ALgorithms. The aim of the workshop was to bring together researchers in search-based metaheuristic techniques with researchers and practitioners in Software Engineering. The workshop sought to support and develop the embryonic community which straddles these two communities and which is working on the application of metaheuristic search-based techniques to problems in Software Engineerin ...

**16 Distributed semantic query: Index structures and algorithms for querying distributed RDF repositories**

Heiner Stuckenschmidt, Richard Vdovjak, Geert-Jan Houben, Jeen Broekstra  
 May 2004 **Proceedings of the 13th international conference on World Wide Web**

Full text available: [pdf\(314.56 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A technical infrastructure for storing, querying and managing RDFdata is a key element in the current semantic web development. Systems like Jena, Sesame or the ICS-FORTH RDF Suite are widely used for building semantic web applications. Currently, none of these systems supports the integrated querying of distributed RDF repositories. We consider this a major shortcoming since the semantic web is distributed by nature. In this paper we present an architecture for querying distributed RDF repositories ...

**Keywords:** RDF querying, index structures, optimization

**17 Metaheuristics in combinatorial optimization: Overview and conceptual comparison**

Christian Blum, Andrea Roli  
 September 2003 **ACM Computing Surveys (CSUR)**, Volume 35 Issue 3

Full text available: [pdf\(431.84 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The field of metaheuristics for the application to combinatorial optimization problems is a rapidly growing field of research. This is due to the importance of combinatorial optimization problems for the scientific as well as the industrial world. We give a survey of the nowadays most important metaheuristics from a conceptual point of view. We outline the different components and concepts that are used in the different metaheuristics in order to analyze their similarities and differences. Two v ...

**Keywords:** Metaheuristics, combinatorial optimization, diversification., intensification

**18 Artificial evolution for computer graphics**

Karl Sims  
 July 1991 **ACM SIGGRAPH Computer Graphics , Proceedings of the 18th annual conference on Computer graphics and interactive techniques**, Volume 25 Issue 4

Full text available: [pdf\(8.74 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper describes how evolutionary techniques of variation and selection can be used to create complex simulated structures, textures, and motions for use in computer graphics and animation. Interactive selection, based on visual perception of procedurally generated results, allows the user to direct simulated evolutions in preferred directions. Several examples using these methods have been implemented and are described. 3D plant structures are grown using fixed sets of genetic parameters. I ...

**19 Inducing heuristics to decide whether to schedule**

John Cavazos, J. Eliot, B. Moss  
 June 2004 **ACM SIGPLAN Notices , Proceedings of the ACM SIGPLAN 2004 conference on Programming language design and implementation**, Volume 39 Issue 6

Full text available: [pdf\(352.40 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Instruction scheduling is a compiler optimization that can improve program speed, sometimes by 10% or more, but it can also be expensive. Furthermore, time spent optimizing is more important in a Java just-in-time (JIT) compiler than in a traditional one because a JIT compiles code at run time, adding to the running time of the program. We

found that, on any given block of code, instruction scheduling often does not produce significant benefit and sometimes degrades speed. Thus, we hoped that we ...

**Keywords:** Java, Jikes RVM, compiler optimization, instruction scheduling, machine learning, supervised learning

**20** Spacetime constraints revisited

J. Thomas Ngo, Joe Marks

September 1993 **Proceedings of the 20th annual conference on Computer graphics and interactive techniques**

Full text available:  [pdf\(329.71 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



**Keywords:** evolutionary computation, genetic algorithms, massive parallelism

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**21** [Compilers: Adaptive java optimisation using instance-based learning](#)

Shun Long, Michael O'Boyle

June 2004 **Proceedings of the 18th annual international conference on Supercomputing**Full text available: [pdf\(231.16 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper describes a portable, machine learning-based approach to Java optimisation. This approach uses an instance-based learning scheme to select good transformations drawn from Pugh's Unified Transformation Framework [11]. This approach was implemented and applied to a number of numerical Java benchmarks on two platforms. Using this scheme, we are able to gain over 70% of the performance improvement found when using an exhaustive iterative search of the best compiler optimisations. Thus we ...

**Keywords:** adaptive optimisation, instance-based learning, java, optimisation space

**22** [Evolving virtual creatures](#)

Karl Sims

July 1994 **Proceedings of the 21st annual conference on Computer graphics and interactive techniques**Full text available: [pdf\(84.65 KB\)](#) [ps\(219.40 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper describes a novel system for creating virtual creatures that move and behave in simulated three-dimensional physical worlds. The morphologies of creatures and the neural systems for controlling their muscle forces are both generated automatically using genetic algorithms. Different fitness evaluation functions are used to direct simulated evolutions towards specific behaviors such as swimming, walking, jumping, and following. A genetic language is presented that uses no ...

**23** [Special issue on SAC 2001 best papers: Evolutionary image enhancement with user behavior modeling](#)

Cristian Munteanu, Agostinho Rosa

April 2001 **ACM SIGAPP Applied Computing Review**, Volume 9 Issue 1Full text available: [pdf\(831.87 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

In this paper we present a novel method for image enhancement of gray-scale images

based on the simulation of evolution. Our method employs Genetic Algorithms to evolve the shape of the contrast curve in the image, while attempting to partially automate the subjective process of image evaluation (e.g. user behavior) by performing multiple regression on fitness values. Results obtained show the robustness and efficiency of the evolutive method for image enhancement. For several images in the test ...

**Keywords:** image enhancement, multiple regression, real-coded genetic algorithms, subjective fitness

**24** [A two-layer library-based approach to synthesis of analog systems from VHDL-AMS specifications](#) 

Alex Doboli, Nagu Dhanwada, Adrian Nunez-Aldana, Ranga Vemuri

April 2004 **ACM Transactions on Design Automation of Electronic Systems (TODAES)**,

Volume 9 Issue 2

Full text available:  [pdf\(658.00 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper presents a synthesis methodology for analog systems described using VHDL-AMS language. Synthesis produces net-lists of analog components that are selected from a library, and sized so that specified objectives (like AC response, signal to noise ratio, dynamic range, area) are optimized. The gap between abstract specifications and implementations is bridged using a two-layered methodology. The first layer is architecture generation. The second layer is component synthesis and constraint ...

**Keywords:** Analog synthesis, VHDL-AMS, branch-and-bound, genetic algorithms, performance estimation

**25** [Learning evaluation functions to improve optimization by local search](#) 

Justin Boyan, Andrew W. Moore

September 2001 **The Journal of Machine Learning Research**, Volume 1

Full text available:  [pdf\(643.21 KB\)](#) Additional Information: [full citation](#), [abstract](#)

This paper describes algorithms that learn to improve search performance on large-scale optimization tasks. The main algorithm, STAGE, works by learning an evaluation function that predicts the outcome of a local search algorithm, such as hillclimbing or Walksat, from features of states visited during search. The learned evaluation function is then used to bias future search trajectories toward better optima on the same problem. Another algorithm, X-STAGE, transfers previously learned evaluation ...

**26** [Evolutionary computing and optimization: Using genetic programming for the induction of novice procedural programming solution algorithms](#) 

Nelishia Pillay

March 2002 **Proceedings of the 2002 ACM symposium on Applied computing**

Full text available:  [pdf\(550.96 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper describes a genetic programming system for the induction of solutions to novice procedural programming problems. This genetic programming system will form part of a generic architecture for the development of intelligent programming tutors for the procedural and object-oriented programming paradigms. An account of the primitives and system parameters needed for the derivation of solutions to problems for each of the introductory procedural programming topics is provided. This is follo ...

**Keywords:** genetic programming, intelligent programming tutors

27 [Evolutionary image enhancement with user behaviour modeling](#)  
Cristian Munteanu, Agostinho Rosa  
March 2001 **Proceedings of the 2001 ACM symposium on Applied computing**  
Full text available:  [pdf\(188.50 KB\)](#) Additional Information: [full citation](#), [references](#), [index terms](#)

**Keywords:** image enhancement, multiple regression, real-coded genetic algorithms, subjective fitness

28 [Computational models: BLOB computing](#)  
Frédéric Gruau, Yves Lhuillier, Philippe Reitz, Olivier Temam  
April 2004 **Proceedings of the first conference on computing frontiers on Computing frontiers**  
Full text available:  [pdf\(1.02 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Current processor and multiprocessor architectures are almost all based on the Von Neumann paradigm. Based on this paradigm, one can build a general-purpose computer using very few transistors, e.g., 2250 transistors in the first Intel 4004 microprocessor. In other terms, the notion that on-chip space is a scarce resource is at the root of this paradigm which trades on-chip space for program execution time. Today, technology considerably relaxed this space constraint. Still, few research works q ...

**Keywords:** bio-inspiration, cellular automata, scalable architectures

29 [Machine learning in automated text categorization](#)  
Fabrizio Sebastiani  
March 2002 **ACM Computing Surveys (CSUR)**, Volume 34 Issue 1  
Full text available:  [pdf\(524.41 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The automated categorization (or classification) of texts into predefined categories has witnessed a booming interest in the last 10 years, due to the increased availability of documents in digital form and the ensuing need to organize them. In the research community the dominant approach to this problem is based on machine learning techniques: a general inductive process automatically builds a classifier by learning, from a set of preclassified documents, the characteristics of the categories. ...

**Keywords:** Machine learning, text categorization, text classification

30 [Group classification using a mix of genetic programming and genetic algorithms](#)  
Aaron Konstam  
February 1998 **Proceedings of the 1998 ACM symposium on Applied Computing**  
Full text available:  [pdf\(583.28 KB\)](#) Additional Information: [full citation](#), [references](#), [index terms](#)

**Keywords:** classification, discriminant functions, genetic algorithms, genetic programming

31 [Session 9C: evolution, adaptation, and learning II: Learning and exploiting context in agents](#)  
Bruce Edmonds

July 2002 **Proceedings of the first international joint conference on Autonomous agents and multiagent systems: part 3**

Full text available:  pdf(308.02 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The use of context can considerably facilitate reasoning by restricting the beliefs reasoned upon to those relevant and providing extra information specific to the context. Despite the use and formalization of context being extensively studied both in AI and ML, context has not been much utilized in agents. This may be because many agents are only applied in a single context, and so these aspects are implicit in their design, or it may be that the need to explicitly encode information about vari ...

**Keywords:** biological analogy, cognitive analogy, context, deduction, evolutionary computation, genetic programming, integration, learning

32 Creating models of truss structures with optimization

---

Jeffrey Smith, Jessica Hodgins, Irving Oppenheim, Andrew Witkin

July 2002 **ACM Transactions on Graphics (TOG)**, Proceedings of the 29th annual conference on Computer graphics and interactive techniques, Volume 21 Issue 3

Full text available:  pdf(2.99 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present a method for designing truss structures, a common and complex category of buildings, using non-linear optimization. Truss structures are ubiquitous in the industrialized world, appearing as bridges, towers, roof supports and building exoskeletons, yet are complex enough that modeling them by hand is time consuming and tedious. We represent trusses as a set of rigid bars connected by pin joints, which may change location during optimization. By including the location of the joints as w ...

**Keywords:** constrained optimization, nonlinear optimization, physically based modeling, truss structures

### 33 Evolving computer programs using rapidly reconfigurable field-programmable gate arrays and genetic programming

John R. Koza, Forest H. Bennett, Jeffrey L. Hutchings, Stephen L. Bade, Martin A. Keane, David Andre

March 1998 **Proceedings of the 1998 ACM/SIGDA sixth international symposium on Field programmable gate arrays**

Full text available: [pdf \(1.37 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper describes how the massive parallelism of the rapidly reconfigurable Xilinx XC6216 FPGA (in conjunction with Virtual Computing's H.O.T. Works board) can be exploited to accelerate the time-consuming fitness measurement task of genetic algorithms and genetic programming. This acceleration is accomplished by embodying each individual of the evolving population into hardware in order to perform the fitness measurement task. A 16-step sorting network for seven items was evolved that h ...

## 34 Applying online gradient descent search to genetic programming for object recognition

Will Smart, Mengjie Zhang

January 2004 **Proceedings of the second workshop on Australasian information security, Data Mining and Web Intelligence, and Software Internationalisation - Volume 32**

Full text available:  [pdf\(207.11 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

This paper describes an approach to the use of gradient descent search in genetic programming (GP) for object classification problems. In this approach, pixel statistics are

used to form the feature terminals and a random generator produces numeric terminals. The four arithmetic operators and a conditional operator form the function set and the classification accuracy is used as the fitness function. In particular, gradient descent search is introduced to the GP mechanism and is embedded into the ...

**Keywords:** data mining, genetic programming, machine learning, object classification

**35 Special issue on special feature: Dimensionality reduction via sparse support vector machines** 

Jinbo Bi, Kristin Bennett, Mark Embrechts, Curt Breneman, Minghu Song  
March 2003 **The Journal of Machine Learning Research**, Volume 3

Full text available:  pdf(243.71 KB) Additional Information: [full citation](#), [abstract](#), [index terms](#)

We describe a methodology for performing variable ranking and selection using support vector machines (SVMs). The method constructs a series of sparse linear SVMs to generate linear models that can generalize well, and uses a subset of nonzero weighted variables found by the linear models to produce a final nonlinear model. The method exploits the fact that a linear SVM (no kernels) with  $\ell_1$ -norm regularization inherently performs variable selection as a side-effect of minimizin ...

**36 Data streams II: Clustering of streaming time series is meaningless** 

Jessica Lin, Eamonn Keogh, Wagner Truppel  
June 2003 **Proceedings of the 8th ACM SIGMOD workshop on Research issues in data mining and knowledge discovery**

Full text available:  pdf(648.63 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

Time series data is perhaps the most frequently encountered type of data examined by the data mining community. Clustering is perhaps the most frequently used data mining algorithm, being useful in its own right as an exploratory technique, and also as a subroutine in more complex data mining algorithms such as rule discovery, indexing, summarization, anomaly detection, and classification. Given these two facts, it is hardly surprising that time series clustering has attracted much attention. T ...

**Keywords:** clustering, data mining, data streams, rule discovery, time series

**37 Distributed collective adaptation applied to a hard combinatorial optimization problem** 

Thomas Haynes  
February 1999 **Proceedings of the 1999 ACM symposium on Applied computing**

Full text available:  pdf(562.92 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** collective adaptation, distributed search

**38 The human genome project and informatics** 

Karen A. Frenkel  
November 1991 **Communications of the ACM**, Volume 34 Issue 11

Full text available:  pdf(9.25 MB) Additional Information: [full citation](#), [citations](#), [index terms](#), [review](#)

**39**

**Parallel program performance prediction using deterministic task graph analysis** 

Vikram S. Adve, Mary K. Vernon

February 2004 **ACM Transactions on Computer Systems (TOCS)**, Volume 22 Issue 1

Full text available:  [pdf \(576.29 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this article, we consider analytical techniques for predicting detailed performance characteristics of a single shared memory parallel program for a particular input. Analytical models for parallel programs have been successful at providing simple qualitative insights and bounds on program scalability, but have been less successful in practice for providing detailed insights and metrics for program performance (leaving these to measurement or simulation). We develop a conceptually simple mode ...

**Keywords:** Analytical model, deterministic model, parallel program performance prediction, queueing network, shared memory, task graph, task scheduling

## 40 MOGAC: a multiobjective genetic algorithm for the co-synthesis of hardware-software embedded systems

Robert P. Dick, Niraj K. Jha

November 1997 **Proceedings of the 1997 IEEE/ACM international conference on Computer-aided design**

Full text available:  [pdf\(137.05 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index](#)  
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In this paper, we present a hardware-software co-synthesis system, called MOGAC, that partitions and schedules embedded system specifications consisting of multiple periodic task graphs. MOGAC synthesizes real-time heterogeneous distributed architectures using an adaptive multiobjective genetic algorithm that can escape local minima. Price and power consumption are optimized while hard real-time constraints are met. MOGAC places no limit on the number of hardware or software processing elements ...

**Keywords:** co-design, co-synthesis, embedded system, genetic algorithm, hardware-software, low power, multiobjective

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## 41 Books reviews

Lynellen D. S. Perry, Erika Orrick  
June 1999 **Crossroads**, Volume 5 Issue 4

Full text available:  [html](#)(40.85 KB) Additional Information: [full citation](#), [index terms](#)

42 Special issue on ICML: Policy search using paired comparisons

Malcolm J. A. Strens, Andrew W. Moore  
March 2003 **The Journal of Machine Learning Research**, Volume 3

Full text available: [pdf\(323.16 KB\)](#) Additional Information: [full citation](#), [abstract](#), [index terms](#)

Direct policy search is a practical way to solve reinforcement learning (RL) problems involving continuous state and action spaces. The goal becomes finding policy parameters that maximize a noisy objective function. The Pegasus method converts this stochastic optimization problem into a deterministic one, by using fixed start states and fixed random number sequences for comparing policies (Ng and Jordan, 2000). We evaluate Pegasus, and new paired comparison methods, using the mountain car problem ...

## 43 Announcements

Amruth Kumar  
April 2000 **intelligence**, Volume 11 Issue 1

Full text available:  [pdf\(565.75 KB\)](#) Additional Information: [full citation](#), [index terms](#)

## 44 Evolution using genetic programming of a low-distortion, 96 decibel operational amplifier

John R. Koza, Forrest H. Bennett, David Andre, Martin A. Keane  
April 1997 **Proceedings of the 1997 ACM symposium on Applied computing**

Full text available: [pdf\(913.91 KB\)](#) Additional Information: [full citation](#), [references](#), [index terms](#)

**Keywords:** analog circuit synthesis, automated circuit design, genetic programming, operational amplifier

#### 45 Student session paper: Corpus-based linguistic indicators for aspectual classification

Eric V. Siegel

June 1999 **Proceedings of the 37th conference on Association for Computational Linguistics**

Full text available:  pdf(792.50 KB)

#### Additional Information: full citation, abstract, references, citations



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Fourteen indicators that measure the frequency of lexico-syntactic phenomena linguistically related to aspectual class are applied to aspectual classification. This group of indicators is shown to improve classification performance for two aspectual distinctions, stativity and completedness (i.e., telicity), over unrestricted sets of verbs from two corpora. Several of these indicators have not previously been discovered to correlate with aspect.

46 DARWIN: CMOS opamp synthesis by means of a genetic algorithm

Wim Kruiskamp, Domine Leenaerts

January 1995 **Proceedings of the 32nd ACM/IEEE conference on Design automation**

Full text available:  pdf(197.88 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

## 47 QM<sup>2</sup>RP: a QoS-based mobile multicast routing protocol using multi-objective genetic algorithm

Abhishek Roy, Sajal K. Das

May 2004 **Wireless Networks**, Volume 10 Issue 3

Full text available:  pdf(477.07 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

With the increasing demand for real-time services in next generation wireless networks, quality-of-service (QoS) based routing offers significant challenges. Multimedia applications, such as video conferencing or real-time streaming of stock quotes, require strict QoS guarantee on bandwidth and delay parameters while communicating among multiple hosts. These applications give rise to the need for efficient multicast routing protocols, which will be able to determine multicast routes that satisfy ...

**Keywords:** QoS, cellular networks, multi-objective genetic algorithms, multicasting

## 48 On the effectiveness of genetic search in combinatorial optimization

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Kihong Park, Bob Carter

February 1995 Proceedings of the 1995 ACM symposium on Applied computing

Full text available:  pdf(830.13 KB) Additional Information: full citation, references, index terms

**Keywords:** combinatorial optimization, genetic algorithm, max-clique, simulated annealing

49 Detecting stress in spoken English using Decision Trees and Support Vector Machines

Huayang Xie, Peter Andreae, Mengjie Zhang, Paul Warren

January 2004 **Proceedings of the second workshop on Australasian information security, Data Mining and Web Intelligence, and Software Internationalisation - Volume 32**

Full text available:  pdf(133.81 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

This paper describes an approach to the detection of stress in spoken New Zealand English. After identifying the vowel segments of the speech signal, the approach extracts two different sets of features - prosodic features and vowel quality features - from the vowel segments. These features are then normalised and scaled to obtain speaker independent feature values that can be used to classify each vowel segment as stressed or unstressed. We used Decision Trees (C4.5) and Support Vector Machines ...

**Keywords:** decision tree, feature extraction, machine learning, speech recognition, stress detection, support vector machine

**50** [Depth-fair crossover in genetic programming](#) 

Matthew Kessler, Thomas Haynes

February 1999 **Proceedings of the 1999 ACM symposium on Applied computing**

Full text available:  pdf(563.68 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** crossover operators, genetic programming

**51** [Reconstructing occlusal surfaces of teeth using a genetic algorithm with simulated annealing type selection](#) 

Vladimir Savchenko, Lothar Schmitt

May 2001 **Proceedings of the sixth ACM symposium on Solid modeling and applications**

Full text available:  pdf(708.02 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper, we present an application of numerical optimization for surface reconstruction (more precisely: reconstruction of missing parts of a real geometric object represented by volume data) by employing a specially designed genetic algorithm to solve a problem concerning computer-aided design in dentistry. Using a space mapping technique the surface of a given model tooth is fitted by a shape transformation to extrapolate (or reconstruct) the remaining surface of a patient's tooth with ...

**Keywords:** computer-aided restoration design, constructive solid geometry, genetic algorithm, simulated annealing, space mapping, surface reconstruction, volume modeling

**52** [Using assortative mating in genetic algorithms for vector quantization problems](#) 

Carlos Fernandes, Rui Tavares, Cristian Munteanu, Agostinho Rosa

March 2001 **Proceedings of the 2001 ACM symposium on Applied computing**

Full text available:  pdf(93.63 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** assortative mating, genetic algorithm, genetic diversity

**53** [The zero/one multiple knapsack problem and genetic algorithms](#) 

Sami Khuri, Thomas Bäck, Jörg Heitkötter

April 1994 **Proceedings of the 1994 ACM symposium on Applied computing**

Full text available:  pdf(568.54 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** 0/1 integer programming, combinatorial optimization, evolutionary computation, genetic algorithm, multiple knapsack problem

## 54 Very greedy crossover in a genetic algorithm for the traveling salesman problem

Byrant A. Julstrom

February 1995 Proceedings of the 1995 ACM symposium on Applied computing

Full text available:  [pdf\(615.32 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** crossover operators, genetic algorithms, traveling salesman problem

## 55 An empirical study of non-binary genetic algorithm-based neural approaches for classification

Parag C. Pendharkar, James A. Rodger

January 1999 **Proceeding of the 20th international conference on Information Systems**

**Full text available:**  pdf(192.45 KB) **Additional Information:** [full citation](#), [references](#), [citations](#), [index terms](#)

## 56 Information access and retrieval: Using genetic algorithms to find suboptimal retrieval expert combinations

Holger Billhardt, Daniel Borrajo, Víctor Maojo

March 2002 **Proceedings of the 2002 ACM symposium on Applied computing**

Full text available: [pdf](#)(613.27 KB) Additional Information: full citation abstract references index terms

Full text available: [PDF \(16.27 KB\)](#) Additional information: [Citation](#), [Abstract](#), [References](#), [Index terms](#)

A common problem of expert combination approaches in Information Retrieval (IR) is the selection of both, the experts to be combined and the combination function. In most studies the experts are selected from a rather small set of candidates using some heuristics. Thus, only a reduced number of possible combinations is considered and other possibly better solutions are left out. In this paper we propose the use of genetic algorithms to find a suboptimal combination of experts for a document coll ...

**Keywords:** data fusion, genetic algorithms, information retrieval

## 57 A weight-coded genetic algorithm for the minimum weight triangulation problem

Kerry Capp, Bryant A. Julstrom

February 1998 Proceedings of the 1998 ACM symposium on Applied Computing

Full text available:  pdf(510.45 KB) Additional Information: full citation, references, citings, index terms

**Keywords:** computational geometry, the minimum weight triangulation problem, triangulations, weighted codings

## 58 On genetic algorithms

Eric B. Baum, Dan Boneh, Charles Garrett  
July 1995. *Practicalities of Threshold*

July 1995 **Proceedings of the eighth annual conference on Computational learning theory**

Full text available:  [pdf\(1.13 MB\)](#) Additional Information: [full citation](#), [references](#), [index terms](#)

**59 Posters: Computational performance of Java and C++ in processing fMRI datasets**

Rodrigo Vivanco, Nicolino Pizzi

November 2002 **Companion of the 17th annual ACM SIGPLAN conference on Object-oriented programming, systems, languages, and applications**Full text available:  [pdf\(195.09 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

Software systems for the analysis of image-based biomedical data, such as functional magnetic resonance imaging (fMRI), require a flexible data model, fast computational techniques and a graphical user interface. Object-oriented programming languages, such as Java and C++ facilitate software reuse and maintainability, and provide the foundations for the development of complex data analysis applications. This paper explores the advantages and disadvantages of using these two programming environme ...

**Keywords:** C++, Java, fMRI data analysis, performance

**60 A weighted coding in a genetic algorithm for the degree-constrained minimum spanning tree problem**

Günther R. Raidl, Bryant A. Julstrom

March 2000 **Proceedings of the 2000 ACM symposium on Applied computing**Full text available:  [pdf\(499.35 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** degree-constrained minimum spanning trees, genetic algorithms, weighted coding

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